COMMUNICATION METHOD, SYSTEM, AND APPARATUS THAT COMBINES ASPECTS OF CYCLIC PREFIX AND ZERO PADDING TECHNIQUES

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RELATED PRIORITY APPLICATION

This application claims priority to U.S. Provisional Application No. U.S. Provisional Application No. 60/450,737 filed on February 28, 2003, which application is hereby incorporated herein by reference in its entirety.

RELATED APPLICATIONS

This application is related to the following applications, all of which are hereby incorporated herein by reference in their entirety: U.S. Provisional Application No. 60/404,070, filed on August 16, 2002; U.S. Application No. 10/389,789 filed on March 17, 2003; U.S. Application No. 10/603,372, filed on June 25, 2003; U.S. Application No. 10/643,108, Attorney Docket No. 5579/4, filed on August 18, 2003, entitled, "System and Method for Multi-Band Ultra-wide Band Signal Generators"; and, U.S. Application No. 10/642,886, Attorney Docket No. 5579/5, entitled, "Scalable Ultra-Wide Band Communication System," filed on August 14, 2003 all of which applications are hereby incorporated herein by reference in their entirety.

one or more symbols are transmitted, and an OFF period during which no signal is transmitted. Further details regarding burst symbol cycles and burst symbol cycle transmission can be found in applications including previously incorporated by reference Application No. 10/389,789.

Still further, in some embodiments, methods, systems, and apparatuses according to the invention can be used in transmission, reception, or communication utilizing varying or fractional Pulse Repetition Frequency (PRF), as described in detail in previously incorporated by reference applications including U.S. Application No. 10/642,884 Attorney Docket No. 5579/5, entitled, "Scalable Ultra-Wide Band Communication System," filed on August 18, 2003. Additionally, some embodiments of the present invention can be used in transmission, reception, and communication using any of various combinations of the above-mentioned techniques.

The present invention provides communication methods, systems, and apparatuses, including methods used with orthogonal frequency division multiplexing and other multi-carrier modulation techniques, as well as methods used with single carrier modulation techniques, including, for example, binary phase shift keying and quaternary phase shift keying.

In some embodiments, a second signal for transmission is obtained from a first signal. In obtaining the second signal, a value or values of an initial portion of the first signal are each multiplied by a number, and a value or values of a symbol tail portion of the first signal are each multiplied by a number, such that each corresponding pair of initial portion and symbol tail portion values are multiplied by a first number and a second number, respectively. For each corresponding pair of initial portion and symbol tail portion values, a sum of the first number and the second number is equal to one. Upon or after reception, a third signal is obtained from the received second signal and used in obtaining information.

in embodiments of the inventive method, inter-carrier interference (ICI) resulting from timing error or frequency error can be reduced. Additionally, a measure of an advantage of zero padding can be achieved in that, to an extent that zero padding type technique is utilized in embodiments of the inventive method, techniques can be employed to allow recovery from selective fading in a similar fashion to the manner in which that advantage can be obtained when a pure zero padding technique is being employed.

Additionally, the technique depicted with reference to FIG. 3 can be used effectively with variable PRF techniques such as those described in previously incorporated by reference U.S. Application No. 10/642,886, Attorney Docket No. 5579/5, entitled, "Scalable Ultra-Wide Band Communication System," filed on August 18, 2003. In particular, in fractional PRF techniques, such a 1/2 or 1/3 PRF techniques, zeros or zero time are effectively available in addition to a zero portion of a signal, as a result of the quiet time between pulses, and the technique depicted with reference to FIG. 3 allows such zeros to be taken advantage of in addition to a zero portion of a signal as described herein, thus allowing better protection against long channel response.